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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/035,592	10/23/2001	Ramiro Castellanos-Nolasco	013377-0087 (B72683)	2887

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EXAMINER

CHAWAN, SHEELA C

ART UNIT

PAPER NUMBER

2625

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/035,592	<b>Applicant(s)</b> CASTELLANOS-NOLASCO ET AL.	
	<b>Examiner</b> Sheela C Chawan	<b>Art Unit</b> 2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☒ Claim(s) 22-24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2/3/03</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Drawings*

1. The Examiner has approved drawings filed on 10/23/01.

### *Claim Rejections - 35 U.S.C. § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishimura et al., (US. 5,761,337 Listed in IDS 2/3/03).

As to claim 1, Nishimura discloses a system for inspecting components (fig 1, element 1 corresponds to bump) comprising:

axial lighting system the component lighting one or more of component to be located (fig 1, element 8 a light source corresponds to an axial lighting, column 7, lines 1- 26); and

off-axis lighting system illuminating the component off-axis lighting the absence axial lighting (note, axial lighting is turned off during illumination of the solder bump fig 1, 1) allow component to inspected to locate features (fig 1, element 9 a light source and element 4 ring light a corresponds to off-axis, column 7, lines 27- 36, column 7, lines 47- 57).

As to claim 2, Nishimura discloses the system further comprising image analysis system receiving image data (fig 1, item 10 corresponds to CCD, column 7, lines 11-

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14) of the component (fig 1 and fig 2, element 1, corresponds to solder bump) and analyzing the image data to locate or more features (locating solder bump on fig 2, item 1 on the wafer surface, column 8, lines 5-15).

As to claims 3 and 10, Nishimura discloses the system wherein image analysis system further comprises feature locator system receiving the image data and generating feature edge data (column 9, lines 41- 67, column 10, lines 1-14).

As to claims 4 and 11, Nishimura discloses the system wherein image analysis system further comprises defect locator system (column 7, lines 37- 46) receiving the image data and generating defect indication data pixel data (column 9, lines 52- 55).

As to claim 5, Nishimura discloses the system wherein image analysis system further comprises protrusion analysis system receiving the image data generating projection size data (column 9, lines 41-51).

As to claim 6, Nishimura discloses the system wherein the image analysis system further comprises system receiving the image data and generating recess analysis data (column 9, line 62 through column 10, lines 1-14).

As to claim 7, Nishimura discloses the system wherein image analysis system further comprises a missing feature system receiving image data and generating missing feature data (column 9, lines 51-55).

As to claim 8, Nishimura discloses the system wherein the image data further comprises pixel data (column 9, lines 44-51).

As to claim 9, Nishimura discloses a system inspecting components (fig 1, element 1 corresponds to bump) comprising:

an off-axis lighting system illuminating component with off-axis lighting to allow component be inspected to locate one more features (fig 1, element 9 a light source and element 4 ring light a corresponds to off-axis, column 7, lines 27- 36, 47- 57); and

an image analysis system receiving image data (fig 1, item 10 corresponds to CCD, column 7, lines 11- 14) component generated when the component illuminated the off-axis lighting analyzing locates the one or more features (column 7, lines 27- 36, 47- 57).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claim 12- 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura et al., (US. 5,761,337 Listed in IDS 2/3/03), as applied to claims 1-11, above and further in view of Eichenlaub (US.5,410,345).

Regarding claim 12 Nishimura discloses a method and apparatus for inspection of the appearance of bumps. The system comprises of :

generating image data of the component (fig 1, item 10 corresponds to ccd, column 7, lines 11- 14, fig 1 and fig 2, element 1, corresponds generating image data of solder bump); and

analyzing the image data to determine whether any of the one or more types of features are present (locating solder bump on fig 2, item 1 on the wafer surface, column 8, lines 5-15).

Nishimura is silent about illuminating the component with off-angle lighting to increase the visibility of one or more types features.

Eichenlaub discloses a stroboscopic illumination system for video displays) a biological detecting system and a fingerprint collating system employing that biological detecting system. The system comprises of:

Illuminating the component with off-angle lighting to increase the visibility of one or more types features (column 11, lines 10-17).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nishimura to include illuminating the component with off-angle lighting to increase the visibility of one or more types features. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nishimura

by the teaching of Eichenlaub in order to prevent it from scattering within the system and causing ghost images to be visible (as suggested by Eichenlaub at column 11, lines 15-17).

As to claim 13, Eichenlaub discloses the method wherein illuminating component with the off-angle lighting comprises illuminating (column 11, lines 10-17) the component with a circular xenon flash lamp (column 5, lines 46- 47, column 5, line 62 through column 6, line 8).

As to claim 14, Eichenlaub discloses the method wherein generating image data of the component comprises generating  $N \times M$  array of pixel data (column 3, line 51 through column 4, line 63).

As to claim 15, Nishimura discloses the system wherein image analysis system further comprises protrusion analysis system receiving the image data generating projection size data (column 9, lines 41-51).

As to claim 16, Nishimura discloses the system wherein the image analysis system further comprises system receiving the image data and generating recess analysis data (column 9, line 62 through column 10, lines 1-14).

As to claim 17, Nishimura discloses the system wherein image analysis system further comprises a missing feature system receiving image data and generating missing feature data (column 9, lines 51-55).

As to claim 18, Nishimura discloses the method wherein analyzing image data determine whether any one features are present comprises generating histogram (note, histogram corresponds to profile data of the bump) data and determining whether

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histogram data indicates feature is present (fig 11A and 11B illustrates reference windows are obtained by modifying the windows which are optimum for extracting profiles of bumps, column15, line 46 through column 16, line 27).

As to claim 19, Nishimura discloses the method wherein analyzing the image data to determine whether any of the one or more types of features are present comprises generating histogram data and determining whether the histogram data indicates that a recess is present (column 3, lines 63- 67, column 4, lines 14-17, column 13, lines 12-44, column15, line 46 through column 16, line 67, column 17, lines 1- 37).

As to claim 20, Nishimura discloses the method wherein data to determine whether any of the one or more types of features are present comprises generating histogram data determining whether the histogram data indicates that a protrusion is present (column 8, lines 5-16, column 13, lines 45- 60, column 14, lines 25- 35, column15, line 46 through column 16, line 67, column 17, lines 4- 37).

4. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura et al., (US. 5,761,337 Listed in IDS 2/3/03), in view of Nichani (US.6,259,827 B1).

Regarding claim 21, claim 21 recites similar limitation as claim 1 above and similarly analyzed. Nishimura is silent about a dual lighting analysis system analyzing image data of the component created when the axial lighting system and the off-axis lighting system are both illuminating the component and generating component acceptance data.



Nichani discloses machine vision methods for enhancing the contrast between an object and its background using multiple on-axis images (column 4, lines 4-18, column 5, lines 5- 15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Nishimura to include a dual lighting analysis system analyzing image data of the component created when the axial lighting system and the off-axis lighting system are both illuminating the component and generating component acceptance data. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nishimura by the teaching of Nichani. This reduces the risk that the object will be moved between acquisitions and, thereby, removes the need to register the images (as suggested by Nichani at column 6, lines 42- 44).

***Allowable Subject Matter***

5. Claims 22 -24 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Other prior art cited***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Engel et al., (US. 5,371,690) discloses method and apparatus for inspection of surface mounted devices.

Hunter (US. 6,697,517 B1) discloses particle detection and embedded vision system to enhance substrate yield and throughput.

Sepai et al., (US.5,455,870) discloses apparatus and method for inspection of high component density printed circuit board.

Svetkoff et al., (US.6,181,425 B1) discloses method and system for high speed measuring of microscope targets.

Bachelder et al., (US.6,748,104 B1) discloses methods and apparatus for machine vision inspection using single and multiple templates or patterns.

***Contact Information***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela C Chawan whose telephone number is 703-305- 4876. The examiner can normally be reached on Monday - Thursday 8 - 6.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 703-308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Sheela Chawan  
Patent Examiner  
Group Art Unit 2625  
November 24, 2004